

**REMARKS**

The office action requests that Applicant update the status of the instant case at page 1, line 1. Applicant has amended page 1 and a substitute page is provided as an attachment hereto and labeled accordingly.

The Abstract is objected to for various informalities. A substitute abstract is provided herewith as an attachment and labeled accordingly.

Claims 1-19 stand rejected under 35 USC §112, second paragraph, as being indefinite. Claims 1-19 have been cancelled, thereby making this rejection moot. The Attorney for Applicant appreciates the thoroughness of the examiner in identifying the indefinite recitations and phrases and apologizes for the fact that there were indefinite phrases in the original set of claims. Every effort has been made to verify that the new claims 20-38 are free from indefiniteness.

Claims 1-19 stand rejected under 35 USC §103(a) as unpatentable over Makovec et al, in view of Harder et al, and Lowther. This rejection is also moot in view of the cancellation of claims 1-19.

Briefly recited, applicant's invention is a spiral bioreactor in which the inter-turn spacing is at least  $1/8^{\text{th}}$  inch and in which the reactant particles are allowed to flow through the bioreactor along with the reagent and feedstock. Applicant has discovered, as stated in the specification, that spiral bioreactors of larger inter-turn spacing in which the reactant particles are not fixed to the surface of the reactor are surprisingly more efficient. The prior art teaches the opposite: smaller inter-turn spacing and attachment of the reactant particles. Once the aligned "un-fixed" reactant particles begin to react with the reagent, an energy potential difference sets up between

the beginning and the end of the spiral that improves reaction rates. None of the prior art references cited, including the references cited by the Applicant in his specification, teach this discovery.

In view of the foregoing amendments and remarks, Applicant believes that the present application is in condition for allowance and reconsideration is requested. If the Examiner disagrees, she is requested to contact the Attorney for Applicant at the telephone number provided below.

Respectfully submitted,

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**SUBSTITUTE PAGE 2 OF THE SPECIFICATION****WITH CHANGES SHOWN EXPLICITLY**

PATENT

**POTENTIAL ENERGY FIELD REACTOR, PROCESS FOR PREPARING AND  
PROCESS FOR UTILIZING SAME****1. Related Application:**

The present application is a [continuation in part of US 09,293,126] continuation-in-part of case serial number 09/293,126, filed April 16, 1999, now abandoned, and [PCT/US97,18749] PCT/US97/18749, filed October 22, 1997.

**2. Field of the invention**

The present invention relates to continuous or batch flow reactors

**3. Discussion of the Prior Art**

In flow reactors, the distance between the flowing medium and the reactant bearing surface (or biocatalyst) is purposely kept very small in order to assure efficient contact between reactants and catalyst. In the patent to Goldberg and Chen (US 4689302) a flow channel spacing is recommended in the range of from 0.0127 to 0.0762 cm or 0.005" to 0.030", referred to herein-below as the prior art cartridge.

When used with bacteria for oxidation of phenol as a model pollutant (Timothy L. Borkowski Quantitative Studies of an Immobilized Cell Oxidative Bioreactor, MS Env Sci New Jersey Institute of Technology (1995); Chad Sheng *Analysis of the Oxidation of Isotox® by Immobilized Bacteria*, MS Env Sci New Jersey Institute of Technology (1995) James Joseph

Woods Aeration and Operation of an Immobilized Cell Oxidative Bioreactor, MS Env Sci New Jersey Institute of Technology (1995)), the prior art cartridge displayed substantial oxidation rates. However, it was believed that in accordance with the principles discussed below, a more

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**SUBSTITUTE ABSTRACT OF THE DISCLOSURE WITH CHANGES SHOWN**  
**EXPLICITLY**

**ABSTRACT OF THE DISCLOSURE**

A potential energy field flow bioreactor for processing a reagent [in feedstocks with reactant particles adsorbed therein] includes a flow pathway [defined by a least one surface,] preferably in the form of a spiral, through which pathway is flowed reactant particles and at least one initial reagent adapted to react therewith [during their passage through the pathway]. The reaction generates an energy potential difference between the beginning of said pathway and its end thereby polarizing the reactant particles \_ whereby they adhere to each other and become immobilized within the pathway.

**SUBSTITUTE ABSTRACT OF THE DISCLOSURE WITH CHANGES**  
**INCORPORATED**

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A potential energy field flow bioreactor for processing a reagent includes a flow pathway, preferably in the form of a spiral, through which pathway is flowed reactant particles and at least one initial reagent adapted to react therewith. The reaction generates an energy potential difference between the beginning of said pathway and its end thereby polarizing the reactant particles, whereby they adhere to each other and become immobilized within the pathway.

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PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re : Samir S. Sofer Atty Docket : 27704-03  
Serial No.: 09/836,497 Examining Atty: Ware, D.K.  
Filing Date: April 17, 2001 Group Art: 1651  
Title: Potential Energy Field Reactor, Process For Preparing and Process for Utilizing  
Same

## Certificate of Transmission by Facsimile

I hereby certify that this Amendment (official response to office action dated 10/01/2003) and related documents is being facsimile transmitted under 37 CFR 1.6 to the United States Patent and Trademark Office (Fax Number 703-872-9306) on March 18, 2004.

  
Kay Brigman